

WHAT IS CLAIMED IS:

1. A brittle material breaking apparatus for breaking of a brittle material that has been scribed with a plurality of scribe lines thereon, the apparatus comprising:

5 a base frame, said base frame comprising two parallel sliding grooves extended in vertical direction;

a lifting mechanism, said lifting mechanism comprising two parallel sliding rails, a transverse plate, and a driving module, wherein said sliding rails extended in vertical direction and adapted to slide along said sliding
10 grooves respectively, said transverse plate affixed between said sliding rails, and said driving module adapted to drive said transverse plate and said sliding rails sliding along said sliding grooves vertically; and

a breaking-cutter module, said breaking-cutter module comprising a carrier, a driving mechanism, and a cutter assembly, wherein said carrier
15 mounted between the sliding rails of said lifting mechanism, said carrier comprising a central cutter slot, said driving mechanism mounted on said carrier, and said cutter assembly comprising a cutter holder, and a breaking-cutter, said cutter holder mounted on said driving mechanism and adapted to be lifted by said driving mechanism, and said breaking-cutter
20 mounted on said cutter holder and adapted to be protruded through said central cutter slot to break one of the scribe lines of said brittle material upon upward movement of said cutter holder by the driving mechanism of said breaking-cutter module.

2. The brittle material breaking apparatus as claimed in claim 1,

wherein the driving mechanism of said breaking-cutter module comprises a fixed member, a movable member, and an air cylinder, said fixed member fixedly mounted on said carrier, said movable member coupled to and adapted to slide along said fixed member, and said air cylinder mounted on said movable member.

3. The brittle material breaking apparatus as claimed in claim 1, wherein said transverse plate is affixed between the respective lower parts of said sliding rails.

4. The brittle material breaking apparatus as claimed in claim 1, wherein the driving module of said lifting mechanism is fixedly mounted on said base frame.

5. The brittle material breaking apparatus as claimed in claim 1, wherein the carrier of said breaking-cutter module is mounted between the respective upper parts of said sliding rails.

6. The brittle material breaking apparatus as claimed in claim 2, wherein the cutter holder of said breaking-cutter module is coupled with the air cylinder of the driving mechanism of said breaking-cutter module.

7. The brittle material breaking apparatus as claimed in claim 6, wherein said breaking-cutter module further comprises a stroke fine adjustment mechanism installed in said carrier, said stroke fine adjustment mechanism comprising a cam shaft, and a motor, said cam shaft coupled to the movable member of the driving mechanism of said breaking-cutter module, and said motor adapted to rotate said cam shaft and to further adjust vertical moving distance of said movable member relative to said

fixed member so as to relatively adjust the moving distance of said cutter holder with said air cylinder relative to said brittle material.

8. The brittle material breaking apparatus as claimed in claim 1, wherein the driving module of said lifting mechanism further comprises a cam shaft linker, a cam shaft, and a motor, said cam shaft coupled to said cam shaft linker, and said motor adapted to rotate the cam shaft of the driving module of said lifting mechanism and to further drive said transverse plate and said sliding rails sliding along said sliding grooves.

9. The brittle material breaking apparatus as claimed in claim 8, wherein said cam shaft linker is fixedly mounted on said transverse plate.

10. The brittle material breaking apparatus as claimed in claim 8, wherein said cam shaft linker comprises a mating slot; the cam shaft of the driving module of said lifting mechanism is coupled to said mating slot and rotated to drive said cam shaft linker vertically up and down.

11. The brittle material breaking apparatus as claimed in claim 8, wherein the motor of said driving module of said lifting mechanism is fixedly mounted on said base frame.

12. The brittle material breaking apparatus as claimed in claim 1, wherein a displacement sensor is installed in said base frame and said transverse plate and adapted to detect the sliding distance of said lifting mechanism relative to said base frame.

13. The brittle material breaking apparatus as claimed in claim 1, wherein said carrier comprises a carrier base, and a vacuum base mounted on said carrier base and adapted to hold said brittle material for breaking.

14. The brittle material breaking apparatus as claimed in claim 13,
wherein said vacuum base has mounted thereon two porous ceramic plates
adapted to hold said brittle material for breaking.

15. The brittle material breaking apparatus as claimed in claim 14,
5 wherein said porous ceramic plates each comprise a plurality of capillaries.

16. The brittle material breaking apparatus as claimed in claim 1,
wherein said brittle material is a semiconductor wafer.

17. The brittle material breaking apparatus as claimed in claim 1,
which is affixed to a flat base plate.

10 18. The brittle material breaking apparatus as claimed in claim 7,
wherein the motor of said stroke fine adjustment mechanism is fixedly
mounted on a carrier base of the carrier of said breaking-cutter module.

19. The brittle material breaking apparatus as claimed in claim 8,
wherein said base frame is provided in between the motor of said lifting
15 mechanism and said sliding rails.

20. The brittle material breaking apparatus as claimed in claim 1,
wherein said transverse plate of said lifting mechanism and said sliding
grooves are respectively disposed at said sliding rails and said base frame at
one side opposite to the motor of said lifting mechanism.

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